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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/657,063	Applicant(s) OFFERHAUS, HERMAN LEONARD 	
	Examiner Audrey Y. Chang	Art Unit 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 April 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>9/3/03</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on **April 25, 2005** has been entered.
2. This Office Action is also in response to applicant's amendment filed on April 25, 2005, which has been entered into the file.
3. By this amendment, the applicant has amended claims 1-2.
4. Claims 1-4 remain pending in this application.
5. The rejections of claims under 35 USC 112, first paragraph, set forth in the previous Office Action still holds for the reasons stated below.

Response to Amendment

6. **The amendment filed on April 25, 2005** is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: **the amended claim 1** recites "a photorefractive crystal" and **the amended claim 2** recites the phrase "said secondary coherent light emission created using photorefractive phase conjugation". The specification **fails** to give support for having a "photorefractive crystal" or to make the secondary coherent light emission *created using photorefractive phase conjugation, in the operation of* generating secondary coherent light emission by using the hologram. The applicant is respectfully

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reminded that in the operation of *generating* the secondary coherent light emission *using* the hologram, (as shown in Figure 1), **NO photorefractive crystal and NO phase conjugation using photorefractive crystal** are included or used. They are used in the *process of making the hologram*, (as shown in Figure 2), which is *completely different* from using the hologram to generate the secondary coherent light emission.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. **Claims 1-2 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The reasons for rejection based on newly added matters are set forth in the paragraph above.

9. **Claims 1-4 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was **not** described in the specification in such a way as to **enable** one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification and the claims **fail** to teach how could a *coherent* laser beam be generated by using a series of laser diodes, a hologram and a mirror for reflecting “some of the secondary coherent light emission” back to the diodes, as recited in claims 1 and 2. Certain kind of phase-locking or mode-

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locking for the laser diodes seems to be needed in order to achieve such feature. The claims only recite a *hologram* is used to generate the *coherent* laser beam, namely the secondary *coherent* light emission, wherein the hologram is actually a *recording* of the *interference pattern* of the **primary light emission** from the series of diode lasers and **the secondary coherent light emission**. It is not clear if the *secondary coherent light emission* is the coherent laser light *intended to be generated* by the apparatus, using the hologram, if so, how then can it be present before hand to record the hologram and then be generated by the hologram? This is completely impossible. It is not clear how could the *interference pattern* be recorded as hologram by using the *primary light emission*, if the primary light emission is **not** coherent light beam already. If the primary light emission is *already coherent* then what is the function of the hologram and mirror, and what is this secondary light emission in the so-called “an apparatus for generating a coherent laser beam from an emission of a series diodes laser comprising a diode array” as recited in the claims. The specification and the claims at this juncture **fail** to disclose an operable apparatus and method.

The specification also *fails* to teach to have the hologram “including an interference pattern of said primary light emission and the secondary coherent light emission” as recited in claim 1. The specification *fails* to teach the interference pattern is the result of the primary emission **and** the secondary coherent light emission. The specification further *fails* to teach that the secondary coherent light emission is used to *record* any interference pattern at all, it is **only** being used as a *feedback* signal to the laser diodes array, as explicitly stated in claims 1-3. No hologram recording the feedback is ever disclosed in the specification.

The specification and the claims further **fail** to teach how could “some of said secondary coherent light emission via the hologram to diode lasers so as to *act* as a *feedback* signal to secure phase-locking”. The specification fails to teach how could the so-called “feedback signal” is capable of phase locking and

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phase locking of what? The applicant is respectfully noted that **critical** and **essential** features are necessary to be included in the claims to make the claims operable.

The specification and the claims fail to teach that the secondary coherent light emission is generated by the illuminating the hologram by the primary light emission and by using photorefractive phase conjugation.

The specification fails to teach explicitly how to generate the secondary coherent light emission by using “photorefractive phase conjugation”.

Claim Objections

10. **Claims 1-4 are objected to because of the following informalities:**

(1). The phrase “a photorefractive crystal” recited in claim 1 is confusing and indefinite since it is not clear what is the structural and logical relationship between this photorefractive crystal and the rest elements in the apparatus. The scopes of the claim therefore are not clear.

(2). It is not clear the primary light emission emitted by the laser diodes array is coherent or not, if it is coherent, then coherent light has already been generated by the laser diodes, what is the point to use the hologram and the reflective mirror. If it is not coherent, then how can the hologram and the reconstruction of the hologram ever be created by the primary light emission? Applicant is respectfully requested to clarify this.

(3). It is not clear if the secondary coherent light emission is generated by the hologram **or** by using the “photorefractive phase conjugation”, or both? Also the photorefractive phase *conjugation* is between what? The term “conjugation” requires at least two members to present, what are these two members that is phase conjugated to each other.

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(4). What is the role of “feedback signal” in relating to the “generation of a coherent laser beam” and in relating to the “making of the hologram”? The scopes concerning this feedback signal are not clearly defined.

(5). The phrase “concentrating and directing the primary light emission ... through the recording medium at an element selected from ... a *photorefractive crystal* in a self pumped configuration, and a *crystal* is fed by a pump beam” recited in claim 3 is very confusing and indefinite since it is not clear what is the “a crystal” and how does it relate to the “photorefractive crystal”. Is it the same or different?

Appropriate correction is required. The applicant is respectfully requested to clarify all these matters to make the claims in comply with the requirements of 35 USC 112, first and second paragraphs and to make them definite. Appropriate correction is required.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. **Claims 1-2 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Roess (PN. 3,763,441) in view of the patent issued to European Patent Application (EP 0 176 329) by Ritter et al.**

Roess teaches a device for *phase-synchronization of several laser oscillators* wherein the device comprises a *plurality of laser diodes* (1 and 2 in Figure 1), serves as the *diode array*, which generate a *first primary light emission* incidents on a *hologram* (5), serves as the *system for transforming* the primary

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light emission into a *secondary coherent* light emission that is then directed to a *mirror* (6). The mirror reflects some of the secondary light emission to make it passes through the hologram and to generate *tertiary light emission* back toward the *plurality of laser diodes*, which serves as *the feedback signal for the diode lasers*, (please see column 2, lines 15-62). Roess teaches that the hologram superposes the primary emission from all of the laser diodes to form a *single* summation wave, which is *coherent* and phase-synchronized, (please see column 2, lines 23-27). The hologram contains an *interference* pattern that is created by the *interference* between a *spherical wave* and a *series of spherical waves that generated from the plurality of laser diodes*. From the standard knowledge of holographic art, the secondary coherent light emission, when reflected from the mirror (6) will act as reconstructing light beam to play back the tertiary light emission that is *conjugated* to the primary light emission. The tertiary light emission will act as the *feedback* signal to induce emission in the laser diodes. This implies interference pattern of the hologram may include the pattern of the primary and secondary light emission.

This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the hologram is of a *reflection* mode. However to make the hologram either of reflection mode or transmission mode does not change the essential operation of the device and the none-critical differences between the two modes is the geometric arrangement of the device. **Ritter** et al in the same field of endeavor does teach explicitly to use a *reflective holographic grating* (70, Figure 5) for reflecting back the feedback signal directly from the reflective hologram to modulate the laser diode source. It would then have been obvious to one skilled in the art to apply the teachings of Ritter et al to modify the arrangement of the device of Roess to accommodate a reflective hologram instead of a transmissive hologram for the benefit of reducing the size and the number of elements used in the device.

Claim 1 has been amended to include the feature of “a photorefractive crystal”. However the **specification fails** to teach a photorefractive crystal is in any way involved in the apparatus of *generating the coherent* laser light by *using* the hologram, (please see Figure 1) and the specification and the claim

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fail to give a *structural and logical relationship* of this crystal with other elements in the apparatus to define an operable apparatus, this feature therefore cannot really be examined in detail here. For one thing, one skilled in the art would know that a photorefractive crystal is a common recording material for the hologram.

Claim 2 has been amended to include the feature “said secondary coherent light emission created using photorefractive phase conjugation”. However the **specification fails** to teach that the secondary coherent light emission is generated by photorefractive crystal conjugation in the *method of generating a coherent laser light by using the hologram*, (please see Figure 1). This feature is also in *direct contradiction* to the limitation of the claim, which states “transforming the primary light emission into secondary coherent light emission by illuminating a hologram with the primary light emission” at earlier part of the claim. This feature therefore cannot be examined here since it is not compatible with other limitations of the claim.

13. Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Roess in view of the patent issued to Khoury et al (PN. 5,337,170).

Roess teaches a device for *phase-synchronization* of several *laser oscillators* wherein the device comprises a *plurality of laser diodes* (1 and 2 in Figure 1), that generate a *first primary light emission* incidents on a *hologram* (5), serves as the *system* for *transforming* the primary light emission into a *secondary coherent light emission* that is then directed to a mirror (6). The mirror then reflects some of the secondary light emission back through the hologram and generates *tertiary light emission* toward the plurality of laser diodes that serves as the feedback signal for the diode lasers, (please see column 2, lines 15-62). Roess teaches that the hologram superposes the primary emission from all of the laser diodes to form a *single* summation wave, which is *coherent* and phase-synchronized, (please see column 2, lines 23-27). The hologram contains an *interference* pattern that is created by the *interference* between a

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spherical wave, serves as the *reference signal*, and a series of spherical waves that are generated from the plurality of laser diodes, which is the primary light emission. It is implicitly true that the hologram is formed in a *recording medium* that is *transparent* or *partially permeable*. The primary light emission that includes the light waves generated from the plurality of laser diodes is diffracted by the hologram wherein the diffracted beam, or the secondary light emission is reflected by the reflector (6) and the reflected light acts as a reconstructing light that illuminates the hologram to create a light emission that is phase-conjugated to the primary emission and serves as the feedback signal to the laser diodes.

This reference has met all the limitations of the claims with the exception that it does not teach to use a self-pumped photorefractive crystal as an alternative means to modulate the primary light emission to create a light emission that is phase-conjugated to the primary light emission to serves as the feedback signal. However using self-pumped photorefractive crystal as phase conjugator to create conjugated light beam in holographic art is rather well known. **Khoury et al teaches explicitly a four wave mixing arrangement** that a *self-pumped photorefractive crystal* $BaTiO_3$ is used as the phase conjugator (C2, Figure 1 or C4 in Figure 2) such that a signal or image light beam (A1) passes through the hologram recording medium (C or C3) is directed to the phase-conjugator crystal (C2 or C4) such that a *phase-conjugated beam* (A2), conjugated with respect to the image beam A1, is *returned* by the conjugator back to the hologram recording medium, (please see columns 1, lines 40-60, column 3-4), for restoring coherence of the signal beam. It would then have been obvious to one skilled in the art to modify the device of Roess by using a self-pumped photorefractive crystal as an alternative means for the phase conjugator to generate the phase conjugated primary emission as the feedback signal for the laser diodes to restore and enhance the coherency.

With regard to claim 4, Khoury et al teaches that a lens (L4) is used to focus the light (A1) to the photorefractive crystal, (C2).

Response to Arguments

14. Applicant's arguments filed on April 25, 2005 have been fully considered but they are not persuasive. The amendments to the claims have been fully considered and they are rejected for the reasons stated above.

15. In response to applicant's arguments concerning the rejections to claims under 35 USC 112, first paragraph, the applicant is respectfully reminded that the arguments are based on the features that are **not** in the claims and **not in** the specification, they therefore cannot be relied upon to overcome the rejections. Also one skilled in the art would know that coherency will not be created by any temporary hologram. The so-called "double phase conjugation" has nothing to do using the "temporary hologram" to create coherency among incoherent light beams.

16. In response to applicant's arguments concerning claims 1-2, based on the newly added features to the claims, that the claims overcome the rejections, the examiner respectfully disagrees since these newly added features are not supported by the specification and not compatible with the claims.

17. In response to applicant's arguments which state that the instant application disclose "a photorefractive would *superimpose* a plurality of *phase* conjugates of the spherical waves NOT single spherical wave" (specification page 4 lines 24-26), which therefore differs from the instant application, the examiner respectfully disagrees for the reasons stated below. **Firstly**, the statement is **wrong** in the sense that it is not the *photorefractive crystal* that "would superimpose phase conjugates of the spherical waves" rather light waves generally can be superimposed to each other, it has nothing to do with the photorefractive crystal. The applicant is respectfully noted that the specification (page 4 lines 24-26) suggests **nothing** of this kind either. **Secondly**, the photorefractive crystal **cannot** "superimpose phase

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conjugates of the spherical waves, since the photorefractive crystal is used to *generate* the phase conjugated wave of the primary light illumination in the present invention. If the superposition takes place, which means the phase will be canceled, (phase conjugation means phases are equal and opposite to each other, the summation will make a zero phase) then NO phase conjugated light will be ever generated. **Thirdly**, the applicant seems to compare with the wrong thing of the cited Roess reference since the superposition of the spherical waves of the cited reference are referred to be in the hologram *recording* medium, which is **different** from the photorefractive crystal. **Fourthly**, applicant's depiction of cited Roess reference of "superimpose of a *single* spherical wave" is completely wrong, a single wave cannot be superimposed with itself. The applicant is respectfully invited to study the cited Roess reference carefully.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Primary Examiner
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A. Chang, Ph.D.